SRE 是什么鬼

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Google SRE 07-14

- YouTube Streaming
  - Video transcoding, streaming, storage

    (> 1PB/month)

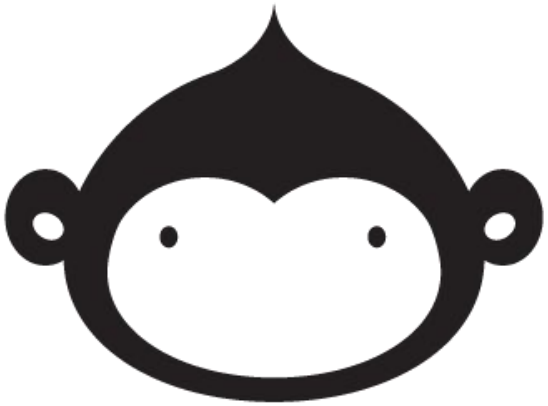
  - Global CDN network

    (> 10K nodes, peaking 10Tbps egress).

Google SRE 07-14

- Google Cloud Platform
  - Machine lifecycle management
    (> X clusters globally, > Y machines)

  - Borg , Omega
    (> X million jobs scheduled every week)



CODING

CLOUD DEVELOPMENT

SITE RELIABILITY ENGINEERING

说白了就是 DevOps 一回事

Site

- 生产线管理员
  - Ensure user-visible uptime and service quality
  - Authority over production environment.
- 跟网站一起成长
  - Steep learning curve, mostly due to complexity
  - Continuous retraining, sites always being improved
- 基础架构设施
  - Specializations for shared infrastructure
  - Ensure those components have good reliability

Reliability

- **it just works**
  - Service Level Objective (SLO)
  - Monitoring/Deployment
  - Capacity Planning

- 以一敌百
  - Team manages monitoring and develops automation
  - Implies use of scripting and data analysis tools
  - Most failures need automated recoveries in place

- 救火队员和纵火犯合体
  - Elevated risk during convenient working hours
  - Learn of age mortality risk during preceding workday
  - Infant mortality ideally also avoids meals

Engineering

- 码农
  - Not administration
- 报警系统重度（中毒）用户
  - Holes may cause outage before notification occurs
  - Routinely use multiple layers, levels and viewpoints
  - Design the manual and automatic escalation paths
- 对未来负责
  - Responsible for enabling growth and scaling
  - Plan for requirements, identify inefficiencies
  - File bugs and, where appropriate, fix them too

Who are SRE

- 跑偏了的程序员
  - 50-50 mix of software background systems engineering background.
- 重度强迫症和处女座
  - “a team of people who fundamentally will not accept doing things over and over by hand.“ – Ben Treynor
- 脸皮厚
  - DEV / OPS

Eternal conflict

- **DEV**
  - The incentive of the development team is to get features launched and to get users to adopt the product.
- **OPS**
  - The incentives of a team with operational duties is to ensure that the thing doesn't blow up on their watch.

一图看懂组织结构

- BOSS
- 产品线
  - 小BOSS
  - 艺术类
  - 开发团队
- 生产线
  - APP SRE
  - Infrastructure SRE
  - 数据中心运营
  - 供应链

组织结构

- 以各产品线为核心，松散的学习型组织
  - Get Incentives right.
  - SRE is a privilege, not a right.
  - Free to move, Free to leave bad service.

- SRE 要做什么 SRE 说了算
  - Production Readiness Review (PRR).
  - ROI matters most for SRE
  - SRE resource is limited
  - High marginal benefits work.

Early phase

- **SRE gives guidance in automating routine tasks**
  - Reduces workload by eliminating administrivia
- **SRE points out errors, omissions in documents**
  - Developer might then beg others for assistance
- **SRE suggests additional long term monitors**
  - These fill in coverage gaps and track performance
  - Administrators need sufficient, trustworthy monitoring

Mature phase

- **The decisions become progressively longer term**
  - Daily task workload for a site is getting reduced
  - Software improvements are tuning and analysis

- **The developer still has a short term viewpoint**
  - Working on the next release, fixing known bugs
  - The old live releases start to be a distraction
  - An obvious incentive to request site transfer to SRE

ONCALL PHASE

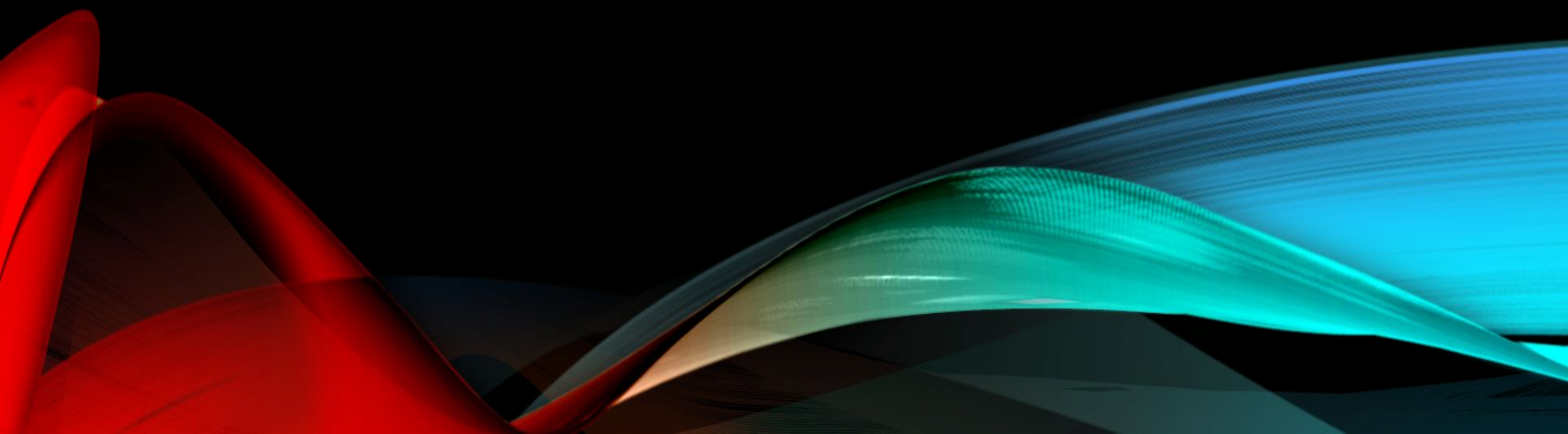
- **On call – more than quick fixes**
- **SRE team members take turns.**
  - Fix any problem whose solution is not yet automated
  - Accumulate occurrence counts to identify priorities Document the effective diagnostics and solutions
- **The permanent solution takes a lot more time**
  - File bug, develop patch, test, code review, submit
  - Schedule for integration, release and deployment
  - Why spend many hours or days doing all that?

Deployment model

- **Following the sun.**
- **Only one engineer responds to any given alert**
  - Use a priority or escalation rule to avoid wasted effort
  - The other SREs on call are unlikely to be disturbed
- **Redundancy everywhere!**
  - What is the failure rate of your paging services?
  - Hopefully better than 10%, unlikely to achieve 1% eg: 5% with four way redundant paths is 99.999%

SRE Best practice

How to build a good SRE team.



CMM maturity model

- Level 1 – Initial (Chaotic, Heroic)
- Level 2 – Repeatable
- Level 3 – Defined
- Level 4 – Managed
- Level 5 – Optimizing

如何有成效的填坑
OPS OVERLOAD

- **Reduce complexity**
  - Less dependencies, configuration types, interfaces.
  - Knowledge sharing
- **Assume there are no humans operating.**
  - Refocus human involvement
- **Quarterly Service Review**
  - Hard cap 50% ops load.
  - Provide career path

正确的和开发团队掐架
SLO Budgeting

- **Establish SLO Goal**
  - Nothing is 100% reliable.
- **Spend error budget**
  - On bad releases, technical debt etc.
  - FREEZE on blown budget.
- **No more arguing**
  - Its' physics!
  - Self-policing Incentives.
  - Moral authority

灾难级别分类
FAILURES

- Failover with minimal delay, near full quality service
- Failover with significant delay, near full quality service
- Partial or limited service, with good to medium quality
- Prevent crash with no or very limited service, low quality
- Crash without data loss or corruption
- Crash with data loss
- Crash with data loss, corruption, destruction

安全生产两大指标
MTBF / MTTR

- Availability = f(MTBF, MTTR)
- You can make it fail very rarely, or you are able to fix it really quickly when it does fail.
- Typically, no human will respond in less than two minutes to something that goes wrong.
- It is that the human correctly assesses the situation and takes the appropriate corrective actions, versus diagnosing incorrectly or taking ineffective steps.

如何设计不会坏的系统
Design: Failures

- **Defense in depth**
  - All the different layers of the system can/will fail..
  - User exp must not be affected.
  - No human involvement.

- **Graceful degradation**
  - Caching / Time shifting
  - Failover
  - Redundant Instances , N + 2
  - Localization of issue.

如何正确的花钱买机器
Capacity planning

- **what N+M do you run your services at?**
  - "I don't know, because we've never assessed what the capacity of our service is."
- **Tips**
  - How to benchmark service,
  - How to measure its response to 100% or 130% of peak.
  - How much spare capacity you have at peak demand time
- **Expect frequent outages and lots of emergencies.**

正确的实现监控系统
DESIGN: monitoring

- **Alerts**
  - which say a human must take action right now. Something that is happening or about to happen, that a human needs to take action immediately to improve the situation.
- **Tickets**.
  - A human needs to take action, but not immediately. You have maybe hours, typically, days, but some human action is required.
- **Logging**.
  - No one ever needs to look at this information, but it is available for diagnostic or forensic purposes. The expectation is that no one reads it.

实战演习
Wheel of misfortune

- Operational readiness drills.
- Tips
  - Picking a disaster
  - Role playing
  - Observe
- Drill people on the correct response to emergency situations until they don't have to think about it.
- Culturally compatible.

地球级别的灾难演习
D.I.R.T

- Simulated disaster recovery.
- Total site loss.
- Incident management.
- Business continuation.

POSTMOTERM

- Blameless postmortem
  - About process and technology, not people
- Readable & shared to wide variety of readers.
- No over-engineering

POSTMOTERM

- Capture the facts
  - Impacted services and magnitude
  - Incident timeline
  - Key contact info
  - Data
- Root cause and trigger analysis
  - 5 Whys
  - Why was this possible in the first place.

POSTMOTERM

- Lessons learned
  - What went well
  - What went wrong
- Action Plan
  - Investigate, management of issue
  - Mitigation
  - Prevention.
- **A problem is resolved to the degree that no human being will ever have to pay attention to it again.**